SIEMENS

DICOM 3.0 Conformance Statement

DICOMLink v1.2 for ICON

Siemens Medical Systems, Inc.

Nuclear Medicine Group

DICOM Conformance Statement

DICOM 3.0 Conformance Statement — Siemens ICON

DICOMlink v1.2 for ICON

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0.0 Introduction

0.1 Purpose of this Document

This document states the conformance of the Siemens ICON™ to DICOM 3.0 standard.

Siemens ICON is a nuclear medicine acquisition and processing system. DICOMlink™ is a software option to the ICON system that provides DICOM 3.0 services.

The DICOMlink application acts as a service class user (SCU) and as a service class provider (SCP) for both the storage and the query/retrieve service classes. Also DICOMlink acts as a service class provider (SCP) for the verification service class.

0.2 Definitions

The following are symbols and abbreviations used within this document.

AE	Application Entity
ACR	American College of Radiology
DICOM	Digital Imaging and Communications in Medicine
DICOMlink	ICON DICOM software application name
DIMSE	DICOM Message Service Element
DIMSE-C	DICOM Message Service Element-Composite
DIMSE-N	DICOM Message Service Element-Normative
ICON	Siemens Nuclear Medicine Computer system
IOD	Information Object Definition
Media Format	DICOM media format, see part 10 of DICOM standard
NEMA	National Electrical Manufacturers Association
OSI	Open Systems Interconnection
PDU	Protocol Data Unit
SCP	Service Class Provider
SCU	Service Class User
SOP	Service-Object Pair
Tag	A 32 bit integer consisting of a group/element pair
TCP/IP	Transmission Control Protocol/Internet Protocol
UID	Unique Identifier
VR	Value Representation refers to a Tag, see part 5 of NEMA standard
VM	Value Multiplicity of tag, see part 5 of NEMA standard

1.0 Implementation Model

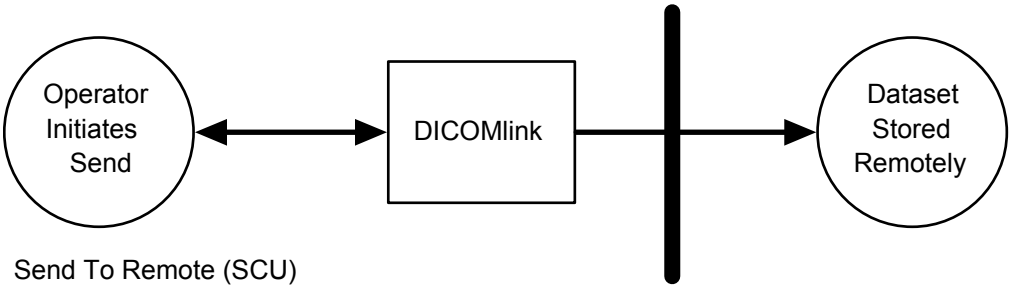
This implementation provides for simple transfer of datasets using the DICOM Storage Service Class as both an SCU and an SCP, and simple management of images using the DICOM Query/Retrieve Service Class as both SCU and SCP. Verification service class is implemented as SCP only.

The operator initiates image transfers from the ICON to a remote AE by selecting images from the ICON Database. Similarly, the ICON operator may initiate the transfer of images from a remote Application Entity (AE) to the ICON by querying a remote node and selecting the appropriate datasets. No operator action is required on the ICON to service Storage requests initiated by a remote AE.

1.1 Application Data Flow Diagram

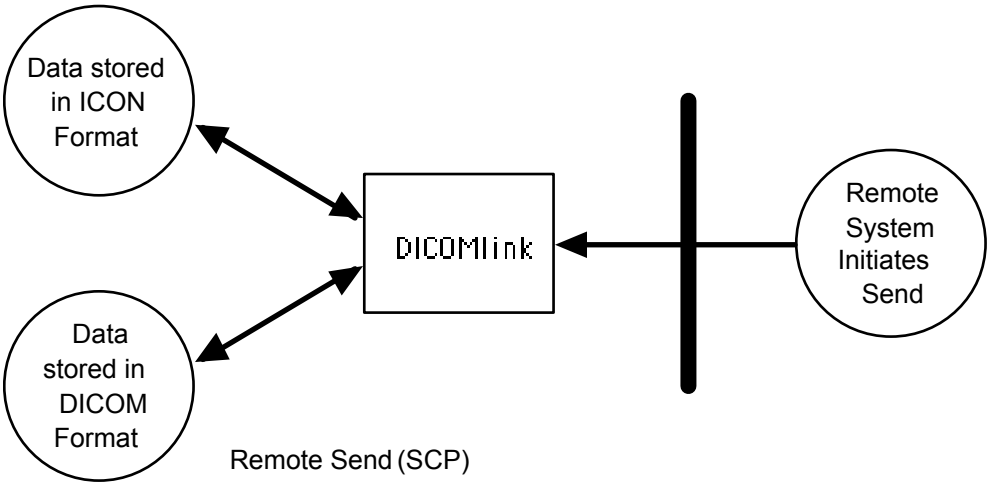
1.1.1 DICOMlink as Storage SCU - Sending ICON Data to a Remote Node

Dataset transfers from the ICON to a remote AE are started when the operator selects a set of patients or datasets to transfer with the ICON database function, and then selects the DICOM transfer function.



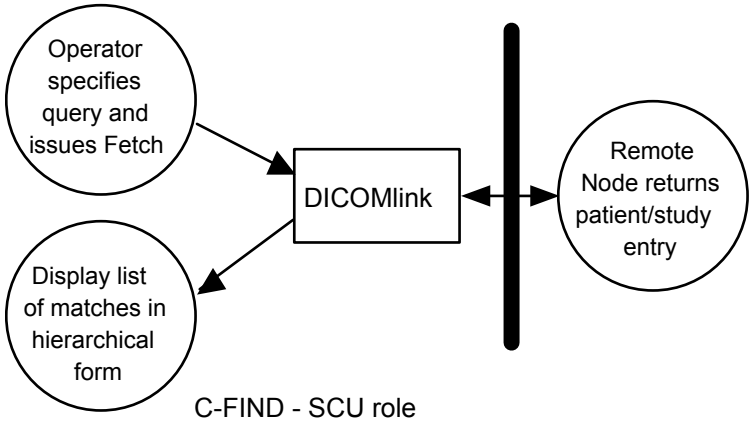
1.1.2 DICOMlink as storage SCP - Receiving Remote Data on the ICON

Dataset transfers from a remote AE to the ICON are initiated by the remote AE. No operator interaction is required on the ICON. The SCP can be configured to store the data in ICON or alternatively DICOM Media Format.

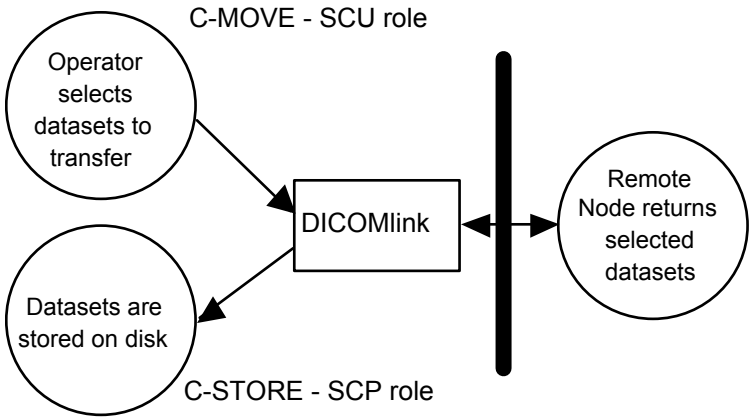


1.1.3 DICOMlink as Query/Retrieve SCU - Selecting and Retrieving Studies

From the DICOMlink application, the operator may select a remote application entity along with search parameters to query a remote node for matching studies. A list is displayed showing the matching sets.

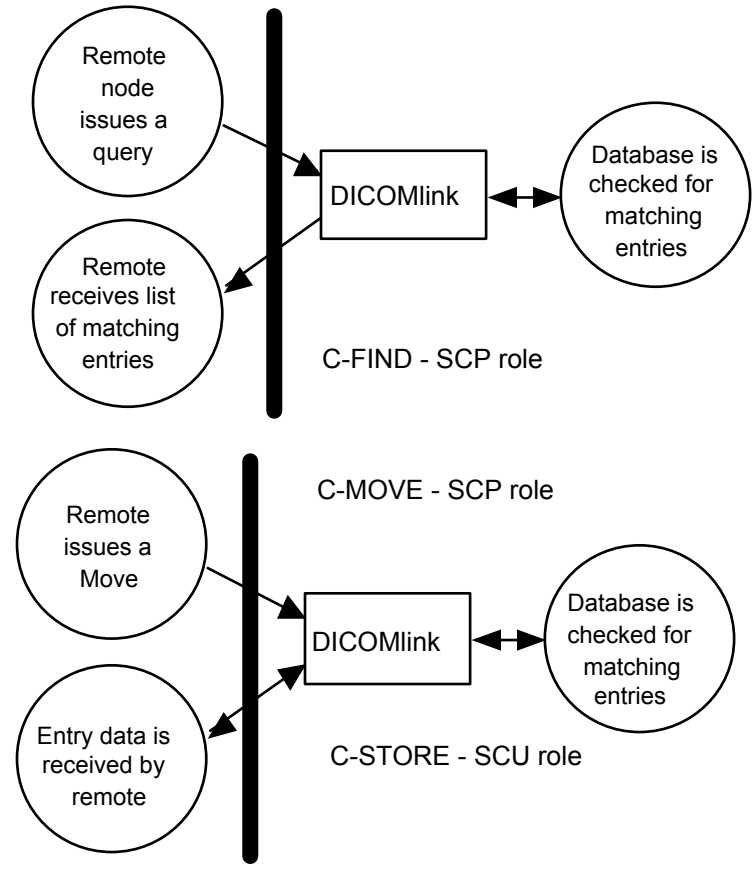


From the list of matching studies, the operator may either select studies to retrieve, further refine the search or request a list of the series for a given study. If refining the search or requesting a list of series for a given study, another C_FIND service is requested as shown above. If studies or series are selected for retrieval, a C_MOVE as a SCU is issued for each object selected. The C_MOVE should cause the remote application entity to issue a C_STORE as a SCU for the objects specified. As below:

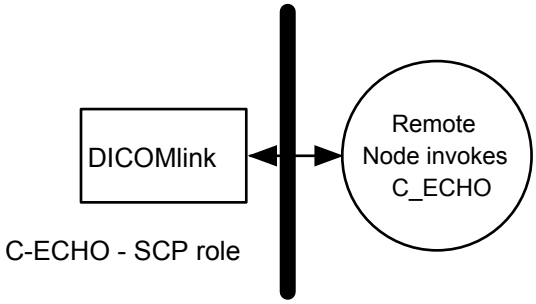


1.1.4 DICOMlink as Query/Retrieve SCP - Servicing Remote Q/R Request

As remote C_FIND and C_MOVE requests are received they are processed.



1.1.5 DICOMlink as Verification SCP - Servicing Remote C_ECHO Request



1.2 Functional Definitions of AE's

1.2.1 DICOMlink as Storage SCU - Sending ICON Data to a Remote Node

When a send is initiated, the operator is presented with the ICON patient list from the DICOMlink launch volume. The operator may select whole patient visits or individual data sets. Also a pop-up menu allows the operator to pick the remote application entity to transfer the data sets to. Once the data sets are selected and the destination node is selected, the operator pushes the send button to initiate the transfer. For each data set selected the DICOMlink software: 1) translates the native ICON dataset into a DICOM message; 2) makes an association with the remote AE; 3) negotiates the Presentation Context; 4) initiates a C-STORE request and 5) closes the association.

ICON Savescreen data is transferred as single frame, 8 bit, black and white data. Color pixels are mapped to an appropriate grayscale value. A pixel element in an ICON Savescreen is an r,g,b component. The gray value mapping for a given pixel element is defined to be [(3*r) + (6*g) + b]/3.

1.2.2 DICOMlink as Storage SCP - Receiving Remote Data on the ICON

DICOMlink provides for importing of data from remote systems. No operator intervention is required on the ICON. The remote node initiates the transfer of data to the ICON. The remote node acts as SCU.

DICOMlink accepts only 8 bit or 16 bit gray scale image data for storage into ICON format. The ICON program will only allow viewing of a limited number of matrix sizes. Depending on the data set DICOMlink may generate ICON data that the ICON program will not display. This data can be manipulated in ICON's MPE environment.

As non-nuclear single image data is received an attempt is made to concatenate uniformly spaced slice data in the same ICON dataset. This concatenation will only take place if the image slice data is transmitted in one association, the slices are uniformly spaced, and are identified as belonging to the same study.

The operator has the option of storing the data in DICOM Media Format or in a DICOM Stream format instead of ICON format. Media format is described in Part 10 of the DICOM standard. Media Format is basically the transmitted group/elements prefaced by a 132 byte header (last 4 bytes are "DICM"). A directory file is not supported. DICOM Stream format is a file containing just the group/elements (i.e. no Media Format header).

1.2.3 DICOMlink as Query/Retrieve SCU - Selecting and Retrieving Studies

Send query requests (C_FIND) to a remote application entity. Displays returned information on matching studies. Allows retrieval of studies via C_MOVE.

1.2.4 DICOMlink as Query/Retrieve SCP - Servicing Remote Q/R Request

Supports the remote query and retrieval requests, C_MOVE and C_FIND. The scope of query may be restricted to the volume the application was launched from, all local volumes or all mounted volumes.

1.2.5 DICOMlink as Verification SCP - Servicing Remote C_ECHO Request

Response to all C_ECHO requests.

1.3 Sequencing of Real-World Activities

Not applicable.

2.0 AE Specifications

DICOMlink acts as a single AE. The operational parameters (including AE title and port number) of DICOMlink are derived from the DICOM Configuration Dialog that is accessible within the DICOMlink Application.

2.1 DICOMlink Specification

DICOMlink provides Standard Conformance to the following DICOM V3.0 SOP Storage Classes.

Table 1: Storage SOP Class

Error! No bookmark name given.SOP Class Name	SOP Class UID	Role
CR Storage	1.2.840.10008.5.1.4.1.1.1	SCP
CT Storage	1.2.840.10008.5.1.4.1.1.2	SCP
MR Storage	1.2.840.10008.5.1.4.1.1.4	SCP
Ultrasound Storage	1.2.840.10008.5.1.4.1.1.6.1	SCP
Secondary Capture Storage	1.2.840.10008.5.1.4.1.1.7	SCP
Nuclear Medicine Storage	1.2.840.10008.5.1.4.1.1.20	SCU and SCP
PET Storage	1.2.840.10008.5.1.4.1.1.128	SCU

Table 2: Query/Retrieve Information Model (Patient Root)

Error! No bookmark name given.SOP CLASS NAME	SOP CLASS UID	ROLE
C_FIND	1.2.840.10008.5.1.4.1.2.2.1	SCP
C_MOVE	1.2.840.10008.5.1.4.1.2.2.2	SCP

Table 3: Query/Retrieve Information Model (Study Root)

Error! No bookmark name given.SOP Class Name	SOP Class UID	Role
C_FIND	1.2.840.10008.5.1.4.1.2.2.1	SCU and SCP
C_MOVE	1.2.840.10008.5.1.4.1.2.2.2	SCU and SCP

Table 4: Query/Retrieve Information Model (Patient/Study Only)

Error! No bookmark name given.SOP Class Name	SOP Class UID	Role
C_FIND	1.2.840.10008.5.1.4.1.2.2.1	SCP
C_MOVE	1.2.840.10008.5.1.4.1.2.2.2	SCP

Table 5: Verification SOP Class

Error! No bookmark name given.SOP Class Name	SOP Class UID	Role
Verification - C_ECHO	1.2.840.10008.1.1	SCP

2.1.1 Association Establishment Policies

2.1.1.1 General

This implementation will generally establish one association per SOP interaction. The operator initiates a transfer by selecting ICON image data (including save screens) and a destination AE. An association is made for each dataset selected for transfer.

The default maximum PDU size is 16384 bytes. This can be adjusted by the operator.

2.1.1.2 Number of Associations

The DICOMlink software will attempt or accept only one association at a time. An exception to this is during a C_MOVE operation of a query/retrieve; the subordinate C_STORE operation is processed while the C_MOVE is active.

2.1.1.3 Asynchronous Nature

DICOMlink will only send a single dataset during an association. There is no asynchronous activity in this implementation.

2.1.1.4 Implementation Identifying Information

DICOMlink will provide a single Implementation Class UID (tag [0002,0012]) which is "1.2.124.285.1."
DICOMlink will provide an implementation version name of "DICOMlink 1.2."

2.1.2 Association Initiation Policy

DICOMlink attempts to initiate a new association for each of the following.

Sending an ICON Dataset to a remote node

Querying a remote node for matching studies

Retrieving studies from a remote node.

2.1.2.1 Real World Activity 1. Sending an ICON Dataset

2.1.2.1.1 Associated Real World Activity

The Associated Real World Activity is the operator selection of datasets to transfer. The DICOMlink software sends the image dataset (C-STORE request).

2.1.2.1.2 Proposed Presentation Contexts

Proposed Presentation contexts for DICOMlink

Error! No bookmark name given. Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
NM Image	1.2.840.10008.5.1.4.1.1.20	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Big Endian Transfer Syntax	1.2.840.10008.1.2.2		
		DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1		

2.1.2.1.3 SOP Specific Conformance

If DICOMlink is unable to open an association for a particular file, two lines of the following form are written to the status window.

<time> Sending to <hostname> (NM): <studyname> -- Error: <err #> in - <error text>

And then it continues with the next file.

When a successful response to a C-STORE operation is received, a single line of the following form is written to the status window.

<time> Sending to <hostname> (NM): <studyname>, OK

When a failed or refused response to a C-STORE operation is received, two lines of the following form are written to the status window.

<time> Sending to <hostname> (NM): <studyname> -- Error: <err #> in - <error text>

DICOMlink will continue with the next file.

DICOMlink will not attempt any extended negotiation.

ICON Savescreens are sent as a single image 8 bit NM STATIC transmission. The following optional elements may be included.

Optional Elements, ICON Savescreen Dataset

Error! No bookmark name given. Tag	Name	Notes
[0008,1030]	Study Description	Always
[0028,0106]	Smallest Image Pixel Value	Always
[0028,0107]	Largest Image Pixel Value	Always
[0028,0108]	Smallest Pixel Value in Series	Always
[0028,0109]	Largest Pixel Value in Series	Always
[0028,1050]	Window Center	Always
[0028,1051]	Window Width	Always

Other ICON image files are converted to Nuclear Medicine Image Objects using the NM Image IOD. The followingoptional elements (Type 3) may be included:

Optional Elements, Other ICON Datasets (not Savescreen)

Error! No bookmark name given. Tag	Name	Notes
[0008,0014]	Instance Creator UID	Always
[0008,0021]	Series Date	If available

[0008,0022]	Acquisition Date	If available
[0008,0031]	Series Time	If available
[0008,0032]	Acquisition Time	If available
[0008,0080]	Institution Name	If available
[0008,1010]	Station Name	If available
[0008,1030]	Study Description	If available
[0008,1040]	Institutional Department Name	If available
[0008,1050]	Performing Physician's Name	If available
[0008,1060]	Name of Physician Reading Study	If available
[0008,1070]	Operator's Name	If available
[0008,1080]	Admitting Diagnoses Description	If available
[0008,1090]	Manufacturer's Model Name	If available
[0010,1000]	Other Patient IDs	If available
[0010,1001]	Other Patient Names	If available
[0010,1010]	Patient's Age	If available
[0010,1020]	Patient's Size	If available
[0010,1030]	Patient's Weight	If available
[0010,4000]	Patient Comments	If available
[0018,0015]	Body Part Examined	If available
[0018,0050]	Slice Thickness	If available
[0018,1000]	Device Serial Number	If available
[0018,1020]	Software Version	If available
[0018,1030]	Protocol Name	If available
[0018,1050]	Spatial Resolution	If available
[0018,1100]	Reconstruction Diameter	If available
[0018,1130]	Table Height	If available
[0018,1200]	Date of Last Calibration	If available
[0018,1201]	Time of Last Calibration	If available

[0018,1210]	Convolution Kernel	If available
[0018,1243]	Count Rate	If available
[0020,0012]	Acquisition Number	If available
[0020,1040]	Position Reference Indicator	If available
[0028,0106]	Smallest Image Pixel Value	Always
[0028,0107]	Largest Image Pixel Value	Always

The image transfer software provides Standard Extended conformance to the DICOM Nuclear Medicine SOP Class. In any data translation some original information is lost. To allow for preservation of this lost information we have added a number of Private data elements. This information could not be encoded in the standard NM IOD. Some receiving systems may need to be informed of the VR for these private elements in order to properly receive and store them. The Private Code for these elements is "SIEMENS MED". Below is the table of these elements.

Note: This table is dynamic in nature. An up-to-date list is available upon request.

Nuclear Medicine Private Element ([group,elem]-VR)

Error! No bookmark name given.[0009,0080]-ST	[0011,0010]-ST	[0017,0020]-ST	[0017,0060]-LO
[0017,1180]-ST	[0017,4000]-ST	[0019,0001]-SS	[0019,0002]-SS
[0019,0003]-SS	[0019,0004]-ST	[0019,0005]-ST	[0019,0006]-SL
[0019,0007]-SL	[0019,0008]-SS	[0019,0009]-SS	[0019,000A]-ST
[0019,000B]-ST	[0019,000C]-SS	[0019,000D]-ST	[0019,000E]-ST
[0019,000F]-SL	[0019,0011]-ST	[0019,0012]-ST	[0019,0013]-SS
[0019,0014]-SS	[0019,0015]-SS	[0019,0016]-SS	[0019,0017]-SS
[0019,0018]-SS	[0019,0019]-SS	[0019,001A]-SS	[0019,001B]-SS
[0019,001C]-SS	[0019,001D]-SS	[0019,0020]-SL	[0019,0021]-SL
[0019,0022]-SL	[0019,0023]-SS	[0019,0024]-SL	[0019,0025]-SL
[0019,0026]-SL	[0019,0027]-SL	[0019,0030]-SL	[0019,0031]-SL
[0019,0032]-SL	[0019,0041]-SS	[0019,0042]-SS	[0019,0043]-SS
[0019,0044]-SS	[0019,0045]-SL	[0019,0047]-SL	[0019,0048]-ST
[0019,0049]-SL	[0019,004A]-SS	[0019,004B]-SS	[0019,004C]-SL

[0019,004E]-SS	[0019,004F]-SS	[0019,0050]-SS	[0019,0051]-SS
[0019,0052]-SS	[0019,0053]-SS	[0019,0054]-ST	[0019,0055]-SS
[0019,0056]-SS	[0019,0057]-SS	[0019,0058]-SS	[0019,0059]-SS
[0019,005A]-ST	[0019,005B]-SS	[0019,005C]-SS	[0019,005D]-SS
[0019,005E]-SS	[0019,005F]-SS	[0019,0060]-SS	[0019,0061]-SS
[0019,0062]-SS	[0019,0063]-SS	[0019,0064]-SS	[0019,0065]-SS
[0019,0066]-SS	[0019,0067]-SS	[0019,0068]-SL	[0019,0069]-SS
[0019,006A]-SS	[0019,006B]-SL	[0019,006C]-SL	[0019,006D]-SS
[0019,006E]-SS	[0019,006F]-SS	[0019,0070]-ST	[0019,0071]-ST
[0019,0072]-SL	[0019,0073]-SL	[0019,0074]-SS	[0019,0075]-SS
[0019,0076]-SS	[0019,0077]-SS	[0019,0078]-SS	[0019,007F]-SS
[0019,0080]-SS	[0019,0081]-SS	[0019,0082]-SL	[0019,0083]-SS
[0019,0084]-SS	[0019,0085]-SS	[0019,0086]-SS	[0019,0087]-SS
[0019,0088]-SL	[0019,0089]-SS	[0019,008A]-SL	[0019,008D]-SL
[0019,008E]-SL	[0019,0091]-SL	[0019,0092]-SL	[0019,0093]-SL
[0019,0094]-SS	[0019,0095]-SS	[0019,0096]-SL	[0019,0097]-SS
[0019,00A0]-SS	[0019,00A1]-SS	[0019,00A2]-SL	[0019,00A3]-SL
[0019,00A4]-SL	[0019,00C0]-SL	[0019,00C1]-SS	[0019,00C2]-SS
[0019,00F0]-SL	[001F,0050]-LO	[001F,1000]-LO	[001F,1000]-LO
[001F,1002]-LO	[001F,1070]-LO	[0021,0010]-LO	[0021,0011]-LO
[0021,0020]-SS	[0031,0001]-ST	[0031,0003]-SL	[0031,0004]-ST
[0031,0005]-SS	[0031,0006]-SL	[0031,0007]-SS	[0031,0008]-ST
[0031,0009]-SS	[0031,000A]-SS	[0031,000B]-SS	[0031,000C]-SS
[0031,000D]-SS	[0031,000E]-SS	[0031,000F]-SL	[0031,0010]-SL
[0031,0011]-SS	[0041,0012]-SL	[0041,0013]-SL	[0041,0021]-ST
[0041,0030]-ST	[0041,0032]-ST	[0041,0034]-ST	[0041,0036]-ST
[0041,0040]-ST	[0041,0050]-SS	[0041,0052]-SS	[0041,0060]-ST
[0041,0070]-SL	[0041,0071]-SL	[0051,0010]-SS	[0051,0011]-SS

[0051,0012]-SS	[0051,0013]-SS	[0051,0014]-SS	[0051,0015]-SL
[0051,0018]-SL	[0053,0001]-SS	[0053,0002]-SS	[0053,0003]-SS
[0053,0010]-SS	[0053,0011]-SL	[0053,0012]-SS	[0053,0013]-SL
[0053,0014]-SS	[0053,0015]-SL	[0053,0016]-SS	[0053,0017]-SS
[0053,0018]-SL	[0053,0019]-SS	[0053,001A]-SS	[0053,001B]-SL
[0053,001C]-SS	[0053,001D]-SL	[0053,0030]-SS	[0053,0031]-SS
[0053,0032]-SS	[0053,0033]-SL	[0053,0040]-SS	[0053,0041]-SL
[0053,0042]-SS	[0053,0043]-SL	[0053,0044]-SS	[0055,0001]-SS
[0055,0002]-SS	[0055,0003]-SL	[0055,0020]-SS	[0055,0021]-ST
[0055,0022]-SS	[0055,0023]-ST	[0055,0024]-SS	[0055,0025]-ST
[0055,0029]-SL	[0055,002A]-SL	[0055,0030]-SS	[0055,0031]-ST
[0055,0032]-SS	[0055,0033]-ST	[0055,0034]-SS	[0055,0035]-ST
[0055,0038]-SL	[0055,0039]-SL	[0055,003A]-SL	[0055,0040]-SS
[0055,0048]-SL	[0055,0050]-SS	[0055,0051]-SS	[0055,0052]-SS
[0055,0053]-ST	[0055,0054]-SL	[0055,0055]-SL	[0055,0056]-SS
[0055,0057]-SS	[0055,0058]-SL	[0055,0059]-ST	[0055,005A]-SL
[0055,005B]-SS	[0055,005C]-ST	[0055,005D]-SS	[0055,005E]-SS
[0055,005F]-SL	[0055,0060]-SS	[0055,0061]-SS	[0055,0064]-SS
[0055,0065]-SS	[0055,0066]-SS	[0055,0067]-SS	[0055,0068]-SS
[0055,0069]-SS	[0055,006A]-SS	[0055,006B]-SS	[0055,006C]-SS
[0055,006D]-SS	[0055,0070]-SL	[0055,0071]-SL	[0055,0072]-SL
[0055,0073]-SL	[0055,0074]-SL	[0055,0075]-SL	[0055,0076]-SL
[0055,0077]-SL	[0055,0078]-SL	[0055,0080]-SS	[0055,0081]-SS
[0055,0082]-SS	[0055,0083]-SS	[0055,0084]-SS	[0055,0085]-SS
[0055,0086]-SL	[0055,0087]-SL	[0055,0088]-SL	[0055,0089]-ST
[0055,008A]-SS	[0055,008B]-SL	[0055,008C]-SS	[0055,008D]-SL
[0055,008E]-SL	[0055,008F]-SL	[0055,0090]-SL	[0055,0091]-SS
[0055,0092]-ST	[0055,0093]-SL	[0055,0094]-SL	[0055,0095]-SL

[0055,0096]-SL	[0055,0097]-SL	[0055,0098]-SS	[0055,0099]-SS
[0055,009A]-SS	[0055,009B]-SS	[0055,009C]-SS	[0055,009D]-SL
[0055,009E]-SL	[0055,009F]-SL	[0055,00A0]-SL	[0055,00A1]-SL
[0055,00A2]-SL	[0055,00A3]-SL	[0055,00A4]-SS	[0055,00A5]-SL
[0055,00A6]-SL	[0055,00A7]-SS	[0055,00A8]-SS	[0055,00A9]-SS
[0055,00B0]-SS	[0055,00B1]-SS	[0057,0010]-SS	[0057,0020]-SL
[5001,0001]-SS	[5001,0002]-SL	[5001,0003]-SL	[5001,0004]-SL
[5001,0005]-SL	[5001,0006]-SL	[5001,0007]-ST	[5001,0008]-ST
[5001,0009]-ST	[5001,000A]-ST	[5001,000B]-SL	[7001,0010]-SS
[7003,0000]-SL	[7005,0000]-SL	[7005,0010]-SS	[7FE1,0010]-SS
[7FE3,0000]-SL	[7FE3,0014]-SL	[7FE3,0015]-SL	[7FE3,0016]-SL
[7FE3,0017]-SL	[7FE3,0018]-SL	[7FE3,0019]-ST	[7FE3,001A]-SL
[7FE3,001B]-SS	[7FE3,001C]-SS	[7FE3,001E]-SL	[7FE3,001F]-SL
[7FE3,0020]-SL	[7FE3,0021]-SL	[7FE3,0022]-SL	[7FE3,0023]-SL
[7FE3,0024]-ST	[7FE3,0025]-SS		

2.1.2.2 Real World Activity 2. Query a remote node for Image Data

2.1.2.2.1 Associated Real World Activity

The Associated Real World Activity is the operator specification of search criteria and a remote application entity to query. The DICOMlink software issues a request for a list of matching studies (C_FIND request).

2.1.2.2.2 Proposed Presentation Contexts

Error! No bookmark name given. Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Study Root Find	1.2.840.10008.5.1.4. 1.2.2.3	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Big Endian Transfer Syntax	1.2.840.10008.1.2.2		
		DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1		

2.1.2.2.3 SOP Specific Conformance

This implementation does not make use of any optional keys. Relational queries are not generated. The user selectable fields for query are 1) patient name, 2) patient ID, 3) study name and 4) a study date range.

2.1.2.3 Real World Activity 3. Retrieving Image Data from a remote node

2.1.2.3.1 Associated Real World Activity

The Associated Real World Activity is the operator selecting studies from a list of studies on a remote node and pressing the fetch button.

2.1.2.3.2 Proposed Presentation Contexts

Error! No bookmark name given. Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Study Root Move	1.2.840.10008.5.1.4. 1.2.2.2	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Big Endian Transfer Syntax	1.2.840.10008.1.2.2		
		DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1		

2.1.2.3.3 SOP Specific Conformance

This implementation provides standard conformance as SCU of C_MOVE.

2.1.3 Association Acceptance Policy

DICOMlink accepts association for each of the following real-world activities.

Remote application entity sends a data set. (C_STORE)

Remote application entity queries for matching datasets. (C_FIND)

Remote application entity requests a dataset. (C_MOVE)

Remote application entity requests an echo. (C_ECHO)

2.1.3.1 Real World Activity 1. Receiving Dataset

2.1.3.1.1 Associated Real-World Activity - C_STORE

The Real-World Activity associated with the C-STORE operation is the storage of the image data on the disk of the system upon which DICOMlink is running. DICOMlink reports an error message to the status window if it is unable to store the image data on disk.

2.1.3.1.2 Presentation Context Table

Any of the Presentation Contexts shown below are acceptable for DICOMlink to receive datasets.

Storage SCP Presentation Contexts for DICOMlink

Error! No bookmark name given. Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	DICOM	UID List		
CR Image	1.2.840.10008.5.1.4.1.1.1	Imp. VR Little Exp. VR Big Exp. VR Little	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
CT Image	1.2.840.10008.5.1.4.1.1.2	Imp. VR Little Exp. VR Big Exp. VR Little	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
MR Image	1.2.840.10008.5.1.4.1.1.4	Imp. VR Little Exp. VR Big Exp. VR Little	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
US Image	1.2.840.10008.5.1.4.1.1.6.1	Imp. VR Little Exp. VR Big Exp. VR Little	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
SC Image	1.2.840.10008.5.1.4.1.1.7	Imp. VR Little Exp. VR Big Exp. VR Little	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
NM Image	1.2.840.10008.5.1.4.1.1.20	Imp. VR Little Exp. VR Big Exp. VR Little	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
PET Image	1.2.840.10008.5.1.4.1.1.128	Imp. VR Little Exp. VR Big Exp. VR Little	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None

2.1.3.1.3 SOP Specific Conformance

2.1.3.1.3.1 SOP Specific Conformance to Storage SOP Classes

An ICON file is created using the tags or elements in the received file. As such, some information will be lost in this translation. In the event of a successful C-STORE operation, the image(s) have been successfully written to disk in ICON file format. The ICON software will automatically incorporate this dataset into the ICON's database without operator intervention. After incorporation into the ICON database the dataset is considered a Nuclear Medicine image. If DICOMlink is used to send this dataset to another system, it will be marked as such.

If the operator configures the DICOMlink application to store incoming data in DICOM format, DICOMlink conforms to the SOP's of the Storage Service Class at Level 2 (Full). In this case no elements are discarded or coerced by DICOMlink. In the event of a successful C-STORE operation, the dataset has successfully been written to disk as a standard Macintosh file. As such, it can be accessed in the same manner as any other Macintosh® file.

DICOMlink will never delete a file that has been received; the duration of the storage of the dataset is determined by other users of the ICON system.

If the C-STORE operation is unsuccessful, an informative error message is written to the status window.

<time> Rec'd to ICON format: <node> (NM): <dataset> -- Error <err #> in - <error text>

Lower level connection and communication information can be optionally routed to a file or the console window.

2.1.3.1.4 Presentation Context Acceptance Criterion

DICOMlink will always accept up to three Presentation contexts on an association provided that all of these Presentation Contexts specify the same Abstract Syntax. The acceptable Presentation Contexts which DICOMlink may accept are specified in section 2.1.3.1.2.

2.1.3.1.5 Transfer Syntax Selection Policies

DICOMlink accepts all the possible transfer syntaxes. If offered a choice of Transfer Syntaxes in a Presentation Context, it will accept the first matching context.

2.1.3.2 Real World Activity 2. Remote Query

2.1.3.2.1 Associated Real-World Activity - C_FIND

2.1.3.2.2 Presentation Context Table

Query SCP Presentation Contexts for DICOMlink

Error! No bookmark name given. Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	DICOM	UID List		
Patient/Study Root Find	1.2.840.10008.5.1.4.1.2.3.1	Imp. VR Little Exp. VR Big Exp. VR Little	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
Patient Root Find	1.2.840.10008.5.1.4.1.2.1.1	Imp. VR Little Exp. VR Big Exp. VR Little	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
Study Root Find	1.2.840.10008.5.1.4.1.2.2.1	Imp. VR Little Exp. VR Big Exp. VR Little	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None

2.1.3.2.3 SOP Specific Conformance

This implementation does not make use of any optional keys. Relational queries are not supported. Required and unique fields and matching criteria are supported at the patient and study level. The accession number is not supported by the ICON; this field is ignored in searching for a patient.

At the series and study search level, no matching is performed. That is at these levels all entries are returned.

As part of configuration of the DICOMlink software, the scope of the search can be limited to 1) the volume the application was launched from, 2) all local volumes or 3) all mounted volumes (includes networked volumes).

2.1.3.2.4 Presentation Context Acceptance Criterion

Remote Application Entity may not mix Storage and Query presentation syntaxes. If a mixture of C_STORE and C_FIND syntaxes is presented, the program assumes a C_STORE operation will follow. In this case if a C_FIND operation is attempted, the message is rejected.

2.1.3.2.5 Transfer Syntax Selection Policies

DICOMlink accepts all the possible transfer syntaxes. If offered a choice of Transfer Syntaxes in a Presentation Context, it will accept the first matching context.

2.1.3.3 Real World Activity 3. Remote Fetch

2.1.3.3.1 Associated Real-World Activity - C_MOVE

2.1.3.3.2 Presentation Context Table

Retrieve SCP Presentation Contexts for DICOMlink

Error! No bookmark name given. Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	DICOM	UID List		
Patient/Study Root Move	1.2.840.10008.5.1.4.1.2.3.3	Imp. VR Little Exp. VR Big Exp. VR Little	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
Patient Root Move	1.2.840.10008.5.1.4.1.2.1.2	Imp. VR Little Exp. VR Big Exp. VR Little	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
Study Root Move	1.2.840.10008.5.1.4.1.2.2.2	Imp. VR Little Exp. VR Big Exp. VR Little	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None

2.1.3.3.3 SOP Specific Conformance

DICOMlink will accept any number of the SOP classes listed above.

2.1.3.3.4 Presentation Context Acceptance Criterion

Remote Application Entity may not mix Storage and Query presentation syntaxes. If a mixture of C_STORE and C_MOVE syntaxes is presented, the program assumes a C_STORE operation will follow. In this case if a C_MOVE operation is attempted, the message is rejected.

2.1.3.3.5 Transfer Syntax Selection Policies

DICOMlink accepts all the possible transfer syntaxes. If offered a choice of Transfer Syntaxes in a Presentation Context, it will accept the first matching context.

2.1.3.4 Real World Activity 4. Remote Verification

2.1.3.4.1 Associated Real-World Activity - C_ECHO

Remote node requests an ECHO from the DICOMlink node.

2.1.3.4.2 Presentation Context Table

Verification SCP Presentation Contexts for DICOMlink

Error! No bookmark name given. Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	DICOM	UID List		
Verification	1.2.840.10008.1.1	Imp. VR Little Exp. VR Big Exp. VR Little	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None

2.1.3.4.3 SOP Specific Conformance

DICOMlink provides standard conformance to the DICOM Verification Service Class.

2.1.3.4.4 Presentation Context Acceptance Criterion

2.1.3.4.5 Transfer Syntax Selection Policies

DICOMlink accepts all the possible transfer syntaxes. If offered a choice of Transfer Syntaxes in a Presentation Context, it will accept the first matching context.

3.0 Communication Profiles

3.1 Supported Communications Stacks (Parts 8, 9)

The DICOMlink software provides DICOM V3.0 TCP/IP Network Communications Support as defined in PS 3.8 of the DICOM standard.

3.2 TCP/IP Stack

DICOMlink inherits the TCP/IP stack from the Macintosh system upon which it runs. The Macintosh implementation is either through the MacTCP implementation or the Open Transport implementation.

3.2.1 Physical media supported

DICOMlink is indifferent to the physical medium over which TCP/IP executes; it inherits this from the Macintosh operating system upon which it operates.

4.0 Extensions/Specializations/Privatizations

No specializations, or privatizations are used in this implementation. The NM Storage SOP Class may be extended as described in section 2.1.2.2.

5.0 Configuration

5.1 AE Title/Presentation Address Mapping - Remote Node definition

DICOMlink provides for definition and editing of the remote Application Entities or nodes. For each remote node the operator specifies the host name, service (always storage), the application entity title, and the port number. The host name must be assigned a TCP/IP address either by the Host file contained within the System Folder or by a name server.

5.2 Configurable Parameters

5.2.1 DICOM Parameters

DICOMlink provides for configuration of the DICOM node within the DICOM application. The following parameters are configurable.

- Application Entity Title
- Port Number
- Maximum Connections (currently 1)
- Maximum PDU size
- DICOM Timeouts for: Connection, Reply, Release and Write

- Low level logging file name and size of logged info
- Selection of logging information

5.2.2 Transmit and Receive Parameters

DICOMlink provides for configuration of the DICOM node within the DICOM application. The following parameters are configurable.

- Format to Store Received Data: ICON, DICOM Stream or DICOM Media format
- Destination folder to store the received data file
- Selection of optional listing file, a file is generated for each dataset received.
- Message validation checking. One of three levels of validation can be performed: Errors, Errors and warnings, and Errors warning and info.

6.0 Support of Extended Character Sets

Extended character sets are not supported by this release.

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